

ART. VI.—*Report of Three Cases of Ruptured Spleen; with Remarks on the different Organic Changes which give rise to this Lesion, and the different modes in which it may occur.* By JAS. J. WARING, M. D., Washington, D. C.

As the time again approaches for the prevalence of miasmatic influence and miasmatic disease, with their usual concomitants—anaemia, enlarged spleen, &c. &c.—it may not be amiss to communicate to the medical profession of this country the report of an accident which occurred in Washington City in the month of November, 1855.

CASE I.—Robert Johnson, aged 17, apprentice to R. M'C., a bricklayer, well formed, and always enjoying sound health till within the last three months of his life, was seized in August, 1855, with an attack of tertian intermittent, which continued with little interruption, for six weeks, that is, till September 26. At the latter date, he was seized with a bilious remittent, which continued nine days—that is, till October 5—accompanied with great enlargement of liver and spleen. Recovered from this severe attack, he continued well, with the exception of an occasional chill, till the evening of Tuesday, November 13, 1855, when he was picked up, in a dying state, on his employer's step.

A few extracts from the coroner's inquest will throw all the light necessary upon the further history of the case.

From the verdict of the jury we find "That the deceased, while engaged, about 7 o'clock in the evening of the 13th, in play with one R. T——r, and others, received a blow of the fist in the left side, from said T., and died about a quarter of eight o'clock of the same evening."

"Among a number of witnesses, sworn and examined on the evening of the 13th, was Dr. Du Hamel, who testified as follows: 'I was called from my office at a few minutes past 7 o'clock this evening, by the witness, M. W. I came round here, and found the deceased, just where he is now lying, nearly in a collapsed condition. I ordered brandy, which was given him. He seemed very desponding; said that he was going to die, that R. T. had struck him in the side. I then asked him where he was struck; he replied, under the ribs. I examined, and found no cut nor bruise of any kind. * * * I think, from his pulse at the time I saw him, his bloodless condition, and his present appearance, that there has been the rupture of some internal organ.'"

Then it was that the jury, in order that there might be no doubt of the cause of death, demanded a *post-mortem*. Invited to assist my friend, Dr. Du Hamel, it is in my power to give the results from my own observation.

Post-mortem, 13 hours after death.—Rigor mortis marked; abdomen tense and full. On opening the abdominal cavity, a slightly reddish-yellow fluid poured out rapidly, which darkened as it flowed. Eventually, large masses of coagulated blood were found in both iliac fossæ, and in the region of the spleen; none, however, in the region of the liver. These masses were in sufficient quantity to fill a large basin. The internal organs and tissues were found in a healthy state, except the spleen. This organ was very much enlarged, eleven inches in length by five in breadth, and weighed quite a pound

It was flaccid, and had, no doubt, diminished considerably in size from the loss of the blood distending it. The fibrous envelop was rather pale. The splenic artery and its branches were uninjured. No unnatural softening existed, nor other organic change of structure; nothing but the *ordinary weakening* from over-distention could be observed. The *hilum* was ruptured from the lower and outer border up one-third its length, and then at right angles across the *concave* surface of the spleen to the external and upper border, to one of those ridges marking the original lobular state of the organ. That portion of the hilum was ruptured which marks the attachment of the colico-splenic omentum. On regarding the rupture, it was plain that the strong fibrous envelop had ruptured where it was weakest, namely, at the hilum. The capsule so lacerated then seemed only to have gaped open, and put on the stretch the trabecular structure, tearing it very little, and that only superficially. This trabecular structure had the usual appearance and consistence of health.

Remarks.—It immediately occurred to me that the very delicate mesh-like tissue of the spleen is *yielding*, and adapted to receive within itself enormous quantities of blood, but that the fibrous capsule is unyielding, and, when put upon its utmost stretch, as it is at times, would be as liable to burst, on the application of an external force, as an ordinary bladder, and, like the latter, would burst at its weakest point. Thus, instead of being lacerated on its convex surface, which must have first received the impression of the blow, the rupture took place on the concave surface, which must have been impressed by *transmission* or *contre coup*, to use a French term. It is easily understood why the trabecular structure was only superficially torn; for, of course, the immediate and enormous outpouring of blood must have promptly relieved the tension: a hemorrhage, however, which would necessarily produce immediate death, even, as it did, in three-quarters of an hour.

I ought not to leave this case without one further comment; of interest, not merely to the medical advisers of communities, but to every member of those communities. There is a disease prevailing extensively in many, very many localities of our country, of so mild a type as to receive the sobriquet of *benignant*, and yet capable of producing such an enlargement or organic change of the spleen as to expose it to the constant danger of fatal rupture, even on the application of so slight a force as that given in sport.

CASE II. (Communicated by Dr. BODAN, of Washington, D. C.)—"Was summoned, May 7, 1854, by the coroner to make a *post-mortem* on the body of Ty. Simms, æt. 40, found dead in his room at an early hour of the same morning. T. S. had been for some time intemperate in habit, he drank freely of ardent spirits, and kept irregular hours, retiring late, oftentimes after having drunk to excess. Parties residing in the same house, and beneath his room, state that he returned home late, and much intoxicated, on the night of the 6th inst. That some time after they were disturbed by hearing a noise as if some one had fallen, or had been knocked down, and that this was followed by the most distressing groans, which became more and more feeble, and at length ceased altogether. That the fall occurred about midnight, and the groaning ceased to be heard in about three hours. On the following morning, T. S. was found lying prostrate across the edge of his bed (a low

wooden bedstead), in such a way that, the epigastrium resting on its edges, the head, superior extremities, and thorax lay on the bed, whilst the inferior extremities, rigidly contracted, rested on the floor.

"Post-mortem.—Upon opening the abdominal cavity, a large amount of partially-coagulated blood escaped; about *four pints*. The peritoneum was natural; the small and large intestines likewise. The stomach, however, was greatly contracted; so much so, indeed, that when dilated to its fullest extent, it could not have held over from four to six ounces. Its coats were hypertrophied and hardened, and the inner coat was of an almost uniform purple colour.

"The spleen was ruptured on its convex surface, in a vertical direction, at the junction of its middle with its external third. The laceration extended about two and a half to three inches in length, through the peritoneal and fibrous envelop, and through the parenchyma to the depth of three-fourths of an inch. The spleen was somewhat above the ordinary size, weighing from six to eight ounces, rather pale and mottled in appearance, firm, not pliant, yet extremely brittle, breaking down before the slightest pressure. Its vessels were enlarged in caliber, but quite empty."

Remarks.—The case, as just detailed, is in perfect contrast with the previous one. In the first case, the spleen was simply enlarged, and its fibrous coat put on the stretch, by an excessive engorgement of blood. No organic change, however, had taken place in its tissue, and, when exposed to a sudden violent blow, it did not give way and rupture at the point struck, but at a point diametrically opposite—the hilum, which is always the weakest point of the spleen unless modified by disease.

Not so in the latter case. The spleen was not much above the natural size, but its structure had been modified by *hypertrophy*, produced by an irritation or subacute inflammation long continued, so that, from its *brittleness*, the rupture naturally took place at the very point struck. This spleen, however, was abundantly supplied with blood, and, as in the previous case, death was sudden (though rather more prolonged to four hours instead of three-quarters of an hour), the immediate cause being an excessive hemorrhage.

CASE III. (Reported by ROBERT KING STONE, M. D., of Washington, D. C.)—"Numerous cases of fracture of the spleen, or rupture of its capsule, have been on record for at least a century and a half, and the able writings of Piorry, Kölliker, and others, render it unnecessary to do more than make statistical additions to medical science. The case which is here offered to the profession should have long since been presented for publication, but for a pseudarthrosis of the femur, under which the writer has suffered for nearly three years past. A recent case of injury and fatal hemorrhage from this organ, occurring in this city (Case I.), has induced me to turn to my notebook for this very interesting case.

"Wm. D.—z, Esq., Chief Clerk of the Indian Bureau of the U. S. War Department, æt. 45, of genial habits, had supped with his friends on the evening of November 2, 1849, and, returning home in the dark night, slipped on the polished marble steps at his own door, striking his left side against one of their angles.

"He rose unaided, feeling at the moment no very great inconvenience from the fall, and entered his parlour. About an hour afterwards, he complained of feeling unwell and nauseated, and was, with a sense of weakness, assisted to his bed. Soon afterwards, he emitted the contents of his stomach, which were copious, from the recent meal. He continued much nauseated, with occasional retching, through the night. My friend, Prof. Thos. Miller, saw him at 3½ A. M., November 3d, and found the patient in the following condition:—

"From the great tenderness in the left hypochondriac region, the patient imagined he had fractured a rib on that side; there was, however, no tumefaction of either thorax or abdomen. Great prostration ensued, the extremities became cold, and the surface was pallid and bathed with clammy perspiration. The pulse scarcely perceptible at times, and the respiration laboured. Occasionally there was great nausea, and the action of the heart very hurried and feeble. The patient became very restless, but was unable to move on account of the great soreness in the left side. The bowels were not moved, and the urine passed was of natural appearance. The occasional vomiting and retching continued from this time until death.

"Dr. Miller made the hopeless diagnosis of fracture of the spleen, or internal hemorrhage from injury of that organ. This distinguished physician remained with him until 7 A. M. of the morning succeeding the fall, and during this period, hot and stimulating applications were made to the general surface and extremities, whilst a cordial and anodyne treatment was directed internally. At 9 A. M., the learned and veteran Dr. B. S. Bohrer was called to the case, and found the condition still the same; saw that he had recently vomited more copiously, and still of undigested food. The symptoms varied little until death closed the scene.

"Having been requested to make the examination of the body, Prof. Miller called my attention at once to the region of the spleen, as he was satisfied I would there find the cause of death. As the patient had died in robust health, the external appearances were all normal. I found the abdomen filled with a large quantity of dark, coagulated blood. On reaching the spleen, it was found of *unusual size and thickness and extremely firm in texture*, with remarkable *brittleness*. The whole of its vertical diameter, on the *external convex surface*, was the seat of a *fracture (not a rupture of the capsule above)* as the fissure dipped into the stroma of the organ itself. The fracture was such as one would make in a firm coagulum of blood or in an Indian-corn cake. The organ was excessively brittle, fracturing under the slightest violence, and of a deep mulberry colour. The main trunk of the splenic artery was uninjured, and the hemorrhage came from the organic branches of that vessel.

"Mr. D. had often been in the southwest country and in the Indian territories, on official business, and had suffered severely with remittent and intermittent disease. The effects of this malarial cause on the spleen, and the bibliography of the accident, are too well known to need further dilatation. The effects of sudden and direct violence on a disturbed stomach, will also occur to every one."

Remarks.—The three cases here faithfully reported, point out two distinct conditions of the spleen in which that organ becomes unusually liable to rupture; they point out, also, two distinct modes in which that rupture may take place. In the first, the organ was simply distended to repletion with blood, and, on the application of an external force, its fibrous capsule alone gave way. In the second and third cases, there was a species of induration from

hypertrophy, accompanied with a peculiar *brittleness*, which rendered both capsule and parenchyma equally liable to rupture.

As to the mode of rupture, it will be observed that the spleen, in the first case, was ruptured, not at the point struck, but at the directly opposite surface; whilst, in the other two cases, the spleens were ruptured at the points receiving the blow. It will be observed, too, that the rapidity of the hemorrhage varied in the three cases; for, as the hemorrhage was the immediate cause of death, the rapidity of its approach indicates the rapidity of the hemorrhage. In the first case, death took place in three-quarters of an hour. This is easily understood, as the spleen, as a diverticulum, was the seat of an unusual afflux of blood. In the second case, it took place in three or four hours, and in the third case in about ten hours. The difference between the last two may be due to the varying degree of hypertrophy; hypertrophy, according to Cruveilhier, having a tendency to pass onward to a degree of consolidation and compactness more and more incompatible with a free circulation.

The applicability of the following extract, translated from Cruveilhier's *Anatomie Pathologique du Genre Humain*, to the organic changes found in the spleens of cases 2 and 3, will, I hope, excuse its insertion. (Liv. 2, Pl. 5, p. 5.)

"Of all lesions of the spleen, the most remarkable, beyond contradiction, are its *induration* and *softening*. The first is always accompanied with augmentation of volume and weight, with a variable *brittleness*; which yet disappears, after a while, to give place to a *coherence* and a compactness such as I have never seen in any tissue or organ of the body. It becomes a dense flesh, in whose thickness is sometimes met an orange-yellow colour around the vessels—traces of sanguineous extravasation. This lesion is accompanied with filamentous, fibrous adhesions, sometimes cartilaginous, even ossified in little spots, or in the totality of the enveloping membrane. This state consists in an *hypertrophy* rather than an *inflammation*."

To render complete any observations that may be made on the "organic changes" which give rise to "ruptured spleen," I continue the translation with a few comments:—

"In *softening*, the spleen never acquires a volume as considerable as in induration. It is rarely seen triple its natural volume, though softened spleens have been met with which weighed from seven to eight pounds. This softening is sometimes partial, more often general, presenting many degrees, so that at the height of this alteration, the spleen is converted into a muddy, disorganized pulp, contained in a sac formed by its membranes distended and weakened, to such a degree, indeed, that a very slight force suffices to tear it. M. le Dr. Balby, in his work on the pernicious fevers observed in the Hospital St. Esprit, at Rome, assures us that he has seen many *fissures* which occurred spontaneously during life. This *splenic mud* (the French term) is sometimes little coloured, sometimes of a chestnut-brown. I have preserved, for several years, a piece of paper tinged with this liquid. It is not uncommon to meet with softening of the spleen in individuals who present other lesions capable of explaining the symptoms observed during life. I even think that it is this so frequent coincidence which has caused observers to overlook this alteration of the spleen as a thing of little importance, perhaps accidental, perhaps,

cadaveric. Hence it is that, in the range of observations, we read of examples of adynamic fevers, enteritis, and other maladies, acute and chronic, in which mention is made of softening of the spleen, without any effort being made to discover its relation to the principal disease."

In this connection, now, it may very properly be asked whether accidental rupture and sudden death have ever occurred in that organic change described above, under the head of softening or ramollissement? I am disposed to think it rare, and then occurring only in the very first stage of softening, occasionally to be found in spleens enlarged by slight attacks of miasmatic disease. In the more aggravated forms, however, it probably never occurs, for two reasons: 1st. Because this change usually accompanies disease which renders the patient incapable of attending to ordinary business or amusement, and hence prevents him from exposing himself to the ordinary casualties of life. 2d. Because, should a rupture take place, the hemorrhage would not be abundant, in the disorganized state of the spleen, and the cause of death would either be a *peritonitis*, should the rupture take place into the peritoneal cavity, or suppuration and abscess, should it take place into the direction of the abdominal parietes.

In conclusion, then, cases No. I, II, and III, stand as a fair type, in my judgment, of all cases of sudden death from ruptured spleen; and, as in these cases, the causes are in the great majority of instances: 1st. *Enlargement, with engorgement*; or, 2. *Hypertrophy and induration, with brittleness.*

ART. VII.—*Surgical Cases.* By F. HINKLE, M.D., Marietta, Lancaster County, Pa.

CASE I. *Extensive Compound Fracture of the Bones of the Face.*

On the 13th of December, 1853, between three and four o'clock A. M., I was sent for to see Thomas Russel, a labourer at an iron furnace. Upon inquiry, I learned that he had been injured in the following manner:—

A lump of coal had caught at the top of the shaft of a furnace at which he was working, so as to interrupt the progress of the elevators. These consist of a series of buckets revolving around a large piece of timber for the purpose of raising the coal. In attempting to remove the coal, he had placed his head between the timber and one of the buckets. As soon as the obstruction was cleared away, the machinery moved again, and, before he could withdraw his head, the edge of the bucket caught under the right malar bone, pressing the occiput against the timber. The force was so great as to draw him from the kneeling to the erect posture.

The men who supply the buckets, after waiting fifteen minutes, finding the impediment to their motion still continuing, and hearing groans, ran to the top of the shaft and found him in the above mentioned position. They procured a board, which was used as a lever to press down the bucket, and, after working twenty minutes, they succeeded in releasing him.